



Foam

Fact Sheet

What causes foam to appear on Indiana Lakes, Rivers and Streams?

Water and other liquids possess a property called *surface tension*. Water molecules are normally attracted to each other. This attraction between molecules pulls those at the surface inward, creating the effect of a thin 'skin' at the surface⁽¹⁾. It is this 'skin', or surface tension, that enables some insects to glide across the surface of water.

Many substances decrease the surface tension of water. Some occur naturally and some result from human activities⁽²⁾. Natural processes include autumn leaves that fall into lakes or streams and decay. The process of decay releases organic substances, such as fatty acids, similar to compounds that produce bubbles in soaps and detergents⁽³⁾.

The molecules of these *foaming agents* are both *hydrophylic* and *hydrophobic* - one end is attracted to water and one end is not. These agents rise to the surface of a river, lake or stream and interact with water molecules. The attraction between the foaming agent and water molecule decreases the surface tension. When the surface tension is decreased, air more easily mixes with water. Bubbles form when air mixes with the interacting water and foaming agent⁽³⁾. These lightweight bubbles can congregate as foam.

When am I likely to see foam on a river, lake or stream?

Since foam occurs through mixing of air and water, you may see foam on a windswept lake or near the bank of a fast flowing stream. You may see more foam at certain times of year, such as fall, after trees lose their leaves, or spring, after trees and flowers lose their buds. When temperatures rise, the process of decay occurs more rapidly, increasing the release of organic substances. Foam may also result from the release of organic compounds found in certain eroding soils, or from human activities, such as gravel washing.

Is the foam harmless?

Foam observed on the surface of water is "usually" harmless. It only takes a small amount of a fatty acid, or other foaming agent, to produce a large amount of foam. The foaming agent is usually about 1% of what you see. The remainder is air and water.

Foam is not always harmless, though. In the past, it was often an indication of pollution. Detergents with high amounts of phosphorus can cause foaming. Phosphorus is an important nutrient, but is not abundant in nature. Large amounts of phosphorus introduced into rivers and lakes cause algae populations to grow quickly. Excessive

nutrients and the resulting algae blooms may create other problems. Indiana has limited the amount of phosphorus a detergent may contain⁽⁴⁾.

How can I tell if the foam is from human activities?

Some differences in the appearance and persistence of foam may indicate whether it is a natural occurrence or caused by human activity. General guidelines include:

“Natural” Foam:

- Light tan or brown in color, but may be white
- An “earthy” or “fishy” or “fresh cut grass” odor
- Dissipates fairly quickly when not agitated

Foam from Human Activity:

- Usually white in color
- A fragrant, perfumed or soapy odor
- Foam persists for a longer period of time

How can I get more information?

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References:

1. Ebbing, Darrell D. 1993. **General Chemistry**. Fourth ed., Houghton Mifflin Co., Boston. 1085pp.
2. **Foam – A Cause for Concern**. David Courtemanch, Aquatic Biologist (MDEP). <http://janus.state.me.us/dep/blwq/doclake/foam.htm>. November 28, 2000.
3. **Natural Foam**. Manitoba Environment, Water Quality Management Section. <http://www.gov.mb.ca/environ/pages/publs97/cwgtext/natfoam.html>. November 28, 2000.
4. **Indiana Administrative Code: 327 IAC 2-5-1-Phosphate Detergents: Permits Required**.